AD-A067 825 NAVAL OCEAN SYSTEMS CENTER SAN DIEGO CA F/G 17/2
POSEIDON COMMUNICATIONS IMPROVEMENT PROGRAM TECHNICAL EVALUATIO--ETC(U)
MAR 79 R LEFFLER

UNCLASSIFIED NOSC/TR-391 NL

OF
AD
A067825

END
DATE
FILMED
6-79
DDC

LEVEL II

13

NOSC

NOSC TR 391

NOSC TR 391

Technical Report 391

POSEIDON COMMUNICATIONS IMPROVEMENT PROGRAM

Technical evaluation test plan for modular interface multiplexing and switching unit and submarine advanced keyboard-printer

R. Leffler

15 March 1979

Prepared for
Naval Electronic Systems Command

APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED.

NAVAL OCEAN SYSTEMS CENTER
SAN DIEGO, CALIFORNIA 92152

NAVAL OCEAN SYSTEMS CENTER, SAN DIEGO, CA 92152

AN ACTIVITY OF THE NAVAL MATERIAL COMMAND

RR GAVAZZI, CAPT, USN
Commander

HL BLOOD
Technical Director

ADMINISTRATIVE INFORMATION

Work on this project was funded by Naval Electronic Systems Command, administered by R. R. Mandich, Submarine Integrated Systems Branch, NOSC, under tasks ED-GRII/OM-FR4 and ED-AS4.7b/ED-GR13.

Released by
W. A. Wright, Head
Test and Evaluation Division

Under Authority of
D. P. Newman, Head
Product Engineering Department

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

14 1. REPORT NUMBER: NOSC TR-391

2. GOVT ACCESSION NO.

3. RECIPIENT'S CATALOG NUMBER

6 4. TITLE (and Subtitle): POSEIDON COMMUNICATIONS IMPROVEMENT PROGRAM Technical Evaluation Test Plan for Modular Interface Multiplexing and Switching Unit and Submarine Advanced Keyboard-Printer

5. TYPE OF REPORT & PERIOD COVERED: Test Plan

6. PERFORMING ORG. REPORT NUMBER

10 7. AUTHOR(s): R. Leffler

9 Technical rept.;

8. CONTRACT OR GRANT NUMBER(s)

9. PERFORMING ORGANIZATION NAME AND ADDRESS

Naval Ocean Systems Center
San Diego, California 92152

10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS

ED-GR11/OM-FR4
ED-AS4.7b/ED-GR13

11. CONTROLLING OFFICE NAME AND ADDRESS

Naval Electronic Systems Command
Washington, D.C. 20360

11 12. REPORT DATE: 15 Mar 1979

13. NUMBER OF PAGES: 21

14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)

12 23p.

15. SECURITY CLASS. (of this report): Unclassified

15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Modular interface multiplexing and switching unit
Submarine advanced keyboard-printer

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This document presents the plans for a series of environmental tests on two interrelated units: a modular interface multiplexing and switching unit (MIMS) and a submarine advanced keyboard printer (SAKP) for the POSEIDON Communications Improvement Program (PCIP).

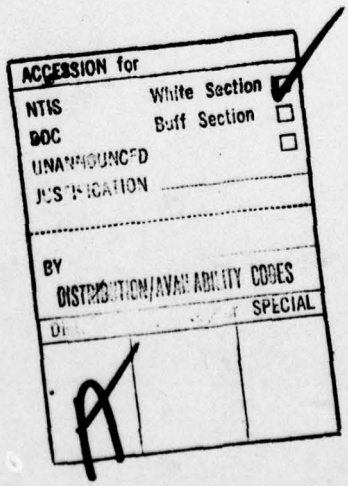
DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE
S/N 0102-LF-014-6601

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

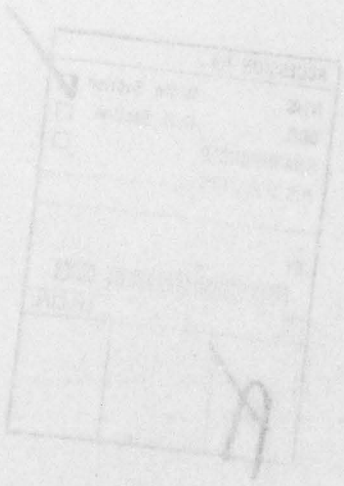
393 159

CONTENTS



TABLES

FIGURES



1. INTRODUCTION

This document presents the plans for a series of environmental tests on two interrelated units: a modular interface multiplexing and switching unit (MIMS) and a submarine advanced keyboard-printer (SAKP). The MIMS unit is a preproduction unit, which upon acceptance will be installed as part of the POSEIDON Communications Improvement Program (PCIP). The SAKP is an off the shelf militarized unit that has been tested previously in accordance with requirements of the British Ministry of Defence Technical Specification TS-1527. Parts of this specification were compounded by inputs from national standards of the United Kingdom, United States of America, Canada and Australia. Subsequent to those tests some functional and physical modifications were made to the printer to permit its use in PCIP.

Adequate specifications for POSEIDON equipment were not available, therefore the requirements of MIL-E-16400, supplemented by those of the TRIDENT class submarine, will be used in the environmental testing of the MIMS and SAKP.

Any revision to these procedures will be reflected in subsequent documents.

1.1 PURPOSE

These tests are intended to verify that the MIMS and SAKP meet their respective design parameters and that their exposure to the environmental requirements of the TRIDENT class submarines[1,2] will not damage or degrade their operation.

1.2 SCOPE

1.2.1 General

Testing will consist of a series of electronic measurements and unit operational tests (for gathering reference data) and environmental tests selected from Table V of Reference 3. Table 1 of this report lists the environmental tests to be performed, the requirement reference which the unit under test must meet and the reference describing the test procedure.

---

1. Specifications for Building Submarines SSBN TRIDENT Class, Naval Ship Systems Command, NAVSHIPS 0902-027-7010, Volumes 1, 2 and 3, 22 May 1973.
2. Specification for Integrated Radio Room for TRIDENT Submarine, Naval Electronic Systems Command, 8556800F, 5 November 1977.
3. Electronic, Interior Communication and Navigation Equipment, Specification, Naval Ship and Shore: General Specification for, MIL-E-16400G, 24 December 1974 (with Amendment 1 dated 1 December 1976).

1.2.2 Description of Test Articles

Three MIMS and three SAKP units will be available for testing.

a. Modular Interface Multiplexing and Switching (MIMS) Unit

The MIMS unit is an electronic interface and control device that stores, buffers and queues incoming data from up to 12 communications channels and prints the messages serially on a submarine advanced keyboard-printer. The MIMS operates under the control of an SAKP and switches incoming and outgoing data to the proper channels without manual intervention. In the event of a power failure or other malfunction, the MIMS, in its bypass mode, will provide automatic channel reconnection for some of its channels to and from peripheral equipments. The unit contains a microprocessor central processing unit with a read only memory (ROM) card that contains a newly developed operating program, which allows for message processing and storage and the initiation of internal system diagnostic tests.

The unit's dimensions are 17.78 cm (7 inches) high, 48.26 cm (19 inches) wide, 60.96 cm (24 inches) deep. It weighs 34.1 kg. (75 pounds). The unit contains 18 printed circuit cards and a power supply.

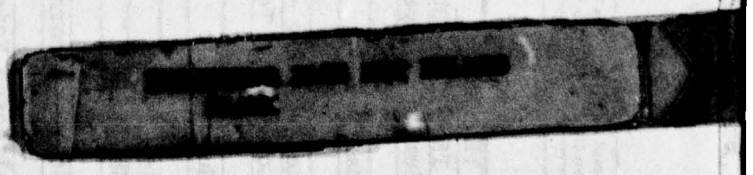
b. Submarine Advance Keyboard-Printer (SAKP)

The SAKP is a militarized send/receive teleprinter, controlled by microprocessor electronics with an internal solid state memory and full message composing and editing capabilities. It is basically the ECI T-1148 Data Storage and Editing Military Teleprinter. The unit prints data up to 120 characters per second, accommodates data rates up to 2400 baud, and operates in switch-selectable ITA-2 (Baudot) or ITA-5 (ASCII) codes. An internal message store module, with a capacity of up to 12,288 characters, is available for complete message composition and editing. Messages may be received and stored in memory for later printout, or composed off-line on the keyboard and stored for future transmission. Messages in storage can be recalled and edited, which permits adding, deleting or overwriting by character or by line. Safeguards prevent accidental deletion or overwriting of stored messages. Additional features provide a status review of messages in storage, and recording of message numbers.

The unit's dimensions are 21.59 cm (8.5 inches) high, 40 cm (15.75 inches) wide, 57.15 cm (22.5 inches) deep. The weight is 27.76 kg (61.7 pounds).

1.3 TEST SCHEDULE

Figure 1 is an estimated schedule. It assumes delivery of two MIMS units by 1 June and one by 1 July, one SAKP unit in February and two more by 1 June. Total test period is estimated at approximately four months.



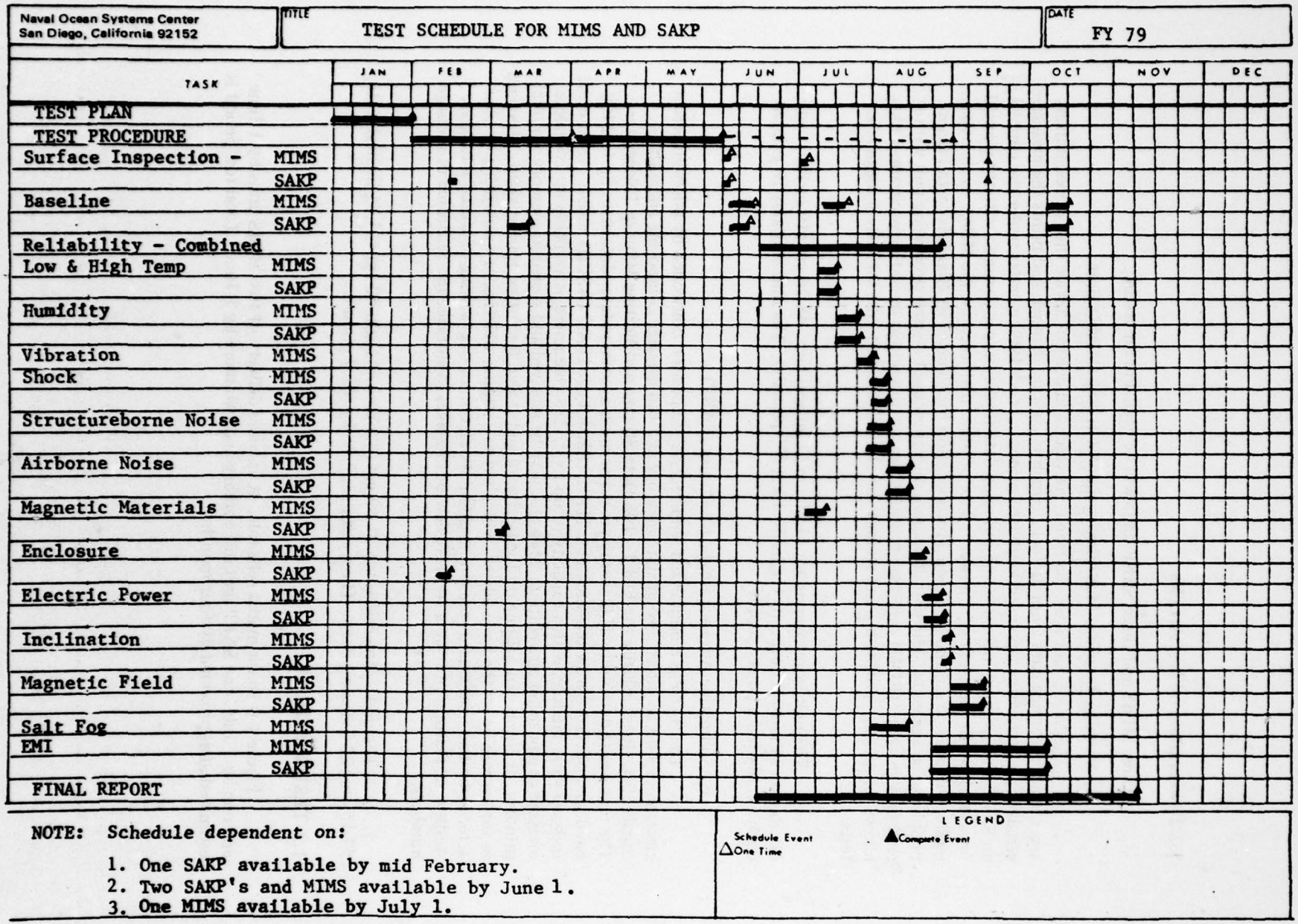


Figure 1. Test schedule for MIMS and SAKP.

Doc. No. 9333-D69-79

2. TEST CONDITIONS

2.1 ENVIRONMENT

Unless otherwise specified herein, measurements and tests shall be made at standard ambient conditions, which are

Temperature	23° ± 10°C (73° ± 18°F)
Relative humidity	50 ± 30 percent
Atmospheric pressure	$97\ ^{+7}_{-10}$ kPa ($725\ ^{+50}_{-75}$ mm Hg)

3. TEST CRITERIA

Three documents, References 1, 2 and 3, will be of basic concern to test personnel. These documents set the criteria to determine satisfactory operation of the units under test.

3.1 FAILURE MODES

The term failure is subdivided into categories to form a guide for determining action subsequent to operational deviation or structural damage. These categories are malfunction, structural failure and catastrophic failure.

Failure shall be defined as a malfunction or parameter deviation that prevents the unit under test from performing within the operational requirements set forth in its specifications. All failures shall be considered relevant unless determined to be caused by a condition external to the unit under test that is not a test requirement and not encountered in service.

- Malfunction is a failure broadly defined as any deviation from specified requirements that does not reduce an output to zero. A definite demarcation between major and minor cannot be specified. Such decisions are left to the judgment of the systems and test engineers. In general, a minor malfunction will not impair the ability of the equipment to perform its principal functions. A major malfunction would cause improper operation for a long period or would cause repetitive failures.
- Structural failure is any deformation or structural damage, such as to encasement or mounts, which limits any movement or function of the unit or its parts, or which places its usage in question.
- Catastrophic failure is any failure which reduces, or causes to be reduced, an output to zero.

The failure mode shall be categorized by the test conductor.

3.2 FAILURE CRITERIA

The unit under test shall have failed a test when any of the following occur:

- Monitored functional parameters or equipment operation deviate from the baseline data recorded prior to the environmental test; where minimum acceptable performance is not specified, the performance after the test shall be the same as performance prior to the test

- Catastrophic or structural failure
- Mechanical binding or loose parts that clearly result in component failure
- Deterioration, corrosion or change in parameter values of any internal or external parts

3.2.1

In case of failure, testing shall be stopped and shall not continue until approval is obtained from the test requester and test conductor. If the failure is a catastrophic failure, final acceptance will require repeating the test in which the failure occurred. It is also necessary to consider whether previous tests had contributed any stresses resulting in the failure. If the failure is minor, the test conductor must decide if it is necessary to repeat the test in question before accepting the results as final. Repeating the test is the preferable course to increase confidence in the unit's acceptability.

3.2.2

In case of a failure, an on-site representative of the manufacturer may examine the unit under test. If the failure can be repaired within 24 hours, testing may continue after the repair upon approval as stated above. If it cannot be done within that time limitation, the test conductor and test requester mutually will agree on a time to restart.

3.2.3

In case of a failure, a failure report shall be written and submitted to the test conductor and test requester. The report shall contain the following information:

- Date and time of failure
- Identification of section of test in which failure occurred
- Identification of previous tests to which the unit under test has been subjected
- Description of failure
- Test engineer's comments and recommendations

4. TEST METHOD

4.1 TEST DESCRIPTION

The PCIP environmental tests are shown in Table 1. The surface examination will be the first test to be performed upon receipt of the units to be tested. It will be followed by a series of baseline measurements (reference measurements). Data selected from these measurements will be monitored during the various environmental exposures for indication of malfunction or degradation. Further measurements will be made at the completion of each environmental test; at the completion of all the environmental tests, selected measurements taken for the baseline shall be repeated. A 2200-hour reliability test will then be performed on the MIMS unit followed by another set of measurements. In the following test descriptions, references are shown for controlling requirements which are referred to in the documents listed in Table 1.

4.1.1 Surface Examination

The main purpose for the surface examination in this particular instance is to assure that good engineering procedures, techniques and safety considerations have been followed in the unit's construction. Each unit involved in the environmental test will be examined. The examination will also serve as a reference in judging future degradation or damage. Table 2 lists the requirements documents.

The surface examination will not be final until all the other testing is completed.

Table 2. Surface examination tasks

Examination Area	Reference Number	Document Number	Requirement or Paragraph
Size and weight	4	Part II	
Nameplates and Markings	5	MIL-STD-454E	67
	6	MIL-P-15024	
	7	MIL-STD-130	
Safety	3	MIL-E-16400G	3.11
	5	MIL-STD-454E	1
Parts and Materials	3	MIL-E-16400G	3.4
Workmanship	5	MIL-STD-454E	9
Finish	3	MIL-E-16400G	3.4.11.3
Soldering	5	MIL-STD-454E	8

4.1.2 Temperature Tests

Low and high temperature tests will be performed in accordance with Reference 3, Paragraphs 4.8.3.1 through 4.8.3.3, with the exception that the upper operating temperature limit will be increased from 50°C to 51.5°C. This will establish that the units under test conform to both the TRIDENT radio room and MIL-E-16400G requirements.

The low temperature testing is described in Method 502.1, Procedure 1 of MIL-STD-810C.[8] When nonoperating, the units will be subjected to a 24-hour soak at -62°C and then stabilized and operated at 0°C.

The high temperature testing is described in Method 501.1, Procedure 1 of MIL-STD-810C. The chamber temperature shall be raised to 71°C and the units will soak for 48 hours when they are nonoperating. The temperature will then be stabilized at 51.5°C and the units

4. Test and Evaluation Plan (POSEIDON Communications Improvement Program), Naval Ocean Systems Center, NOSC Report 813-657, January 1979.
5. Military Standard, Standard General Requirements for Electronic Equipment, MIL-STD-454E, 1 March 1976.
6. Military Specification, Plates, Tags, and Bands for the Identification of Equipment, MIL-P-15024D, 10 May 1971.
7. Military Standard, Identification Marking of U. S. Military Property, MIL-STD-130L, 5 August 1977.
8. Military Standard, Environmental Test Methods, MIL-STD-810C, 10 March 1975.

operationally tested. During the high temperature testing, the chamber humidity will be maintained between 40 and 60 percent relative humidity (RH).

4.1.3 Humidity Test

The units under test will be subjected to a humidity test in accordance with the procedures in MIL-STD-810C, Method 507, Procedure IV, as specified in MIL-E-16400G. This test entails five 24-hour temperature cycles; a cycle consists of 16 hours at 60°C with 95 percent RH and 8 hours at 30°C at 95 percent RH. The units will be tested operationally twice throughout the test period; once at 50°C and again at 30°C. Malfunctions caused by paper exposure to moisture shall not be cause for rejection or retest. A dry roll of paper may be inserted and testing continued.

4.1.4 Vibration Test

The MIMS unit will be vibration tested in accordance with the procedures of MIL-STD-167B[9] for type 1 equipment except that the frequency range will be limited to 25 Hz, per Reference 1. The following tests will be conducted separately on each of the units in each of the principal axes of vibration:

- Exploratory vibration test to determine resonances
- Variable frequency test of five minutes at each integral frequency from 4 to 25 Hz
- Endurance test to vibrate for a total of at least two hours at the chosen resonant frequencies

It should be noted that "resonance" is defined as that frequency at which a peak amplitude of motion is observed, and where any change in frequency causes a decrease in response. This differs from the definition in Section 9400-2-c of Reference 1 and offers a more closely defined test frequency.

The unit will be hard-mounted to the vibration table similar to its mountings aboard ship.

E-System, Inc., the manufacturer of the SAKP unit, performed a vibration test on the keyboard-printer in accordance with requirements of the British Department of Defence, therefore, the test need not be repeated. The SAKP satisfactorily met these requirements, which exceeded the MIL-E-16400G requirements. The test data and results are reported in Reference 10.

---

9. Military Standard, Mechanical Vibrations of Shipboard Equipment (Type I—Environmental and Type II—Internally Excited), MIL-STD-167B, 11 August 1969. (This is not the latest version of this document, but it is the version specified in Reference 1.)
10. Environmental Qualification of Teletypewriter Set, ECI Model OW1148U, for Cossor Electronics, E-System, Inc., ECI Division, Report No. 5-1546, 20 September 1978.

4.1.5 Shock Test

The units under test will be subjected to the high impact shock test in accordance with MIL-S-901C[11] as specified by MIL-E-16400G. The general service condition requirements for lightweight equipment under which the units shall be tested are defined as grade B (non-hazardous), type A (principal unit supported by ship's structure), class I (no resilient mounts allowed). The unit under test will be operated before, during and after the shock test, but its only requirement is to create no hazard to personnel or vital systems. The mounting is to be representative of that used for shipboard installations.

4.1.6 Magnetic Materials

Using a low-mu permeability indicator, the magnetic characteristics of the unit under test will be examined to establish that the relative magnetic permeability is not greater than 2.0, which is in compliance with Paragraph 3.7.6.1 of Reference 3.

4.1.7 Enclosure

The MIMS unit will be dripproof tested while operating, using inclined angles of 45° in accordance with MIL-STD-108E[12] as specified in Paragraph 3.7.2.1 of MIL-E-16400G. The SAKP unit will be examined visually only, since it is determined to have an "open, protected" degree of enclosure. This type enclosure "provides no environmental protection and permits free transmission of air" (Reference 12). The SAKP unit will be examined to assure that the enclosure offers impediments to "gross accidental contact by personnel or equipment."

4.1.8 Electrical Power Characteristics

The unit's electrical power characteristics will be examined using the procedures in Paragraph 4.8.5 of MIL-E-16400G. The normal line voltages and frequencies to be referenced will be:

MIMS	115V, 60 Hz
SAKP	115V, 60 Hz

The electrical tests and the corresponding paragraph in MIL-E-16400G describing the procedure to be performed are listed in Table 3.

4.1.9 Airborne Noise

The airborne noise requirements to be attained are specified in Section 9400-2, Tables 2 and 5, of Reference 1 and further delineated in Paragraph 3.2.6.7 of Reference 2. Both units under test will be considered for A-12 categories which is a space "where

---

11. Military Specification, Shock Tests, HI (High-Impact), Shipboard Machinery, Equipment and Systems, Requirements for, MIL-S-901C, 15 January 1963 (with Amendment 1 dated 5 September 1963).
12. Military Standard, Definitions of and Basic Requirements for Enclosures for Electric and Electronic Equipment, MIL-STD-108E, 4 August 1966.

Table 3. Electrical power characteristics test procedures

Test	MIL-E-16400G Paragraph
Steady state voltage and frequency	4.8.5.1
Transient voltage (less 700 V transient)	4.8.5.2
Transient frequency	4.8.5.3
Spike voltage (with modified spike of 1000 V)	4.8.5.4
Power interrupt	4.8.5.5
Power and power factor	4.8.5.6

communication distance is 12 plus or minus six feet." Sound pressure measurements will be used in accordance with the procedure in MIL-STD-740-1.[13] Even though this standard is not yet approved, it supports octave band data in sound pressure units rather than sound power units. Using an A weighted (broadband) scale, the maximum allowable sound pressure level specification is 50 dBA at one meter distance from the unit under test.

4.1.10 Structureborne Noise

The structureborne noise criteria (for type 3 equipment) and procedures are found in MIL-STD-740B. The units under test will be mounted resiliently (even though this will not be the case aboard ship) and vibration accelerometers will be used to record broadband and one-third octave band measurements. Graphic presentations of the recordings will be made for analysis purposes. The structureborne criterion is 65 dB for one-third octave band frequencies up to 8000 Hz.

4.1.11 Inclination

The units under test will be examined visually to determine their susceptibility to inclinations of 60° in any direction. Any indication that the unit's operation might be affected will cause the enactment of the cyclic inclination procedures presented in Paragraph 4.8.3.16.1 of MIL-E-16400G. Inclinations up to 60° of the unit in any direction must not have any momentary or permanent effects.

4.1.12 Magnetic Field

An environment of concern[14] is created when the ship is being degaussed. This being the case, the equipment can be tagged and removed from the ship at the time of degaussing. This permits the personnel to avoid an additional expensive test and the test has been deleted from the plan with the consent of the sponsor.

---

13. Military Standard, Airborne Sound Measurements and Acceptance Criteria of Shipboard Equipment (Draft Status), MIL-STD-740-1.
14. Section 401, Military Standard, Interface Standard for Shipboard Systems, D.C. Magnetic Field Environment, MIL-STD-1399 (NAVY), 11 January 1971.

4.1.13 Salt Fog

The salt fog test is conducted to determine the resistance of the unit under test to the effect of a salt atmosphere. Representative samples of the metallic material, finishes and welds used in, or externally mounted on, the encasement of the unit will be subjected to the environmental test conditions of Paragraph 4.8.3.5.2 of MIL-E-16400G. After the test items are rinsed they will be compared to their pretest condition. No base metal should be visible through the structure's finish.

The manufacturer of the SAKP successfully has completed testing for exposure to salt fog and the test data and results are reported in Reference 10, therefore, this test will not be repeated on the SAKP.

4.1.14 Electromagnetic Interference (EMI)

The requirements and procedures in MIL-STD-461A and MIL-STD-462[15,16], respectively, will guide the conduct of EMI tests, except that requirement deviations found in the TRIDENT EMC Control Plan[17] will be considered when evaluating the test data.

The tests to be performed on each of the units (separately) are shown in Table 4. They will be classified as Class IC, non-antenna communication-electronics equipment.

Table 4. EMI tests for MIMS and SAKP units

Test Method	Description of Test Method
CE01	Conducted emissions on power leads, 30 Hz to 20 kHz
CE02	Conducted emissions on control and signal leads, 30 Hz to 20 kHz
CE03	Conducted emissions on power leads, 20 kHz to 50 MHz
CE04	Conducted emissions on control and signal leads, 20 kHz to 50 MHz
CS01	Conducted susceptibility on power leads, 30 Hz to 50 kHz
CS02	Conducted susceptibility on power leads, 50 kHz to 400 MHz
CS06	Conducted susceptibility on power leads, spike
RE01	Radiated emission, magnetic field induction, 30 Hz to 30 kHz
RE02	Radiated emission, electric field, 14 kHz to 1 GHz
RS01	Radiated susceptibility to magnetic field radiation, 30 Hz to 30 kHz
RS02	Radiated susceptibility to magnetic induction fields
RS03	Radiated susceptibility to electric field, 14 kHz to 1 GHz

15. Military Standard, Electromagnetic Interference Characteristics, Requirements for Equipment, MIL-STD-461A, 1 August 1968 (with Notice 1 dated 7 February 1969).
16. Military Standard, Electromagnetic Interference Characteristics, Measurement of, MIL-STD-462, 31 July 1967 (with Notice 1 dated 1 August 1968).
17. Rev. D, TRIDENT EMC Control Plan, NAVSHIPS 0900-078-1010, 30 January 1977 (with Change 1 dated 7 November 1978).

4.1.15 Reliability

A reliability demonstration will be performed on both MIMS and SAKP with the operating time divided between two units of each. There will be two setups, with MIMS and SAKP interconnected, in the environmental chamber and operating simultaneously. The actual test duration will be 46 days. The goal is to demonstrate, for both the SAKP and MIMS, an MTBF of 5840 hours. Testing will, therefore, be performed in accordance with Test Plan XXIC (fixed time) of MIL-STD-781C[18] using the following parameters:

a. The input power line voltages will be maintained constant at the unit's nominal operating value, since the cycling of this voltage the specified ±7 percent (Table 1 of Reference 18) would not create enough stress to warrant the cost of the necessary setup.

b. The vibration level will be maintained at 1G for a fixed nonresonant frequency between 20 and 60 Hz for 10 minutes of each hour.

c. The chamber temperature will be held constant at 50°C.

The units will be operated continuously throughout the test period with a 20 percent duty cycle each day, i.e., the SAKP will be printing messages for 20 percent of each day. Once each day, the units will be operationally examined to determine their level of performance.

4.1.16 Baseline Measurements

a. MIMS – A test of the MIMS will be developed so as to demonstrate that its parameters conform satisfactorily. The parameters to be examined are to be determined.

b. SAKP – A test of the SAKP will be developed so as to demonstrate that its parameters conform satisfactorily with its design specification.[19] Some of the major parameters to be examined are:

- Operation of the teleprinter and keyboard transmitter in either Baudot or ASCII code
- Printing in any of three prescribed modes
- Printing speed of 120 characters per second
- Capability to receive and transmit Baud rates of 50 to 2400
- Operation from either low or high current interface
- Indicators, such as RCV BUSY lamp, end-of-line alarm, low paper warning lamp, power on indicator and others
- SAKP will tolerate 48 percent marking bias distortion of the received signal
- Even, odd or no parity condition check

---

18. Military Standard, Reliability Design Qualification and Production Acceptance Tests: Exponential Distribution, MIL-STD-781C, 21 October 1977.
19. Design Specification for a Teleprinter Set, ECI Model OW1148U, Issue 6, E-Systems, Inc., ECI Division, ES 20166, 16 June 1978.

5. TEST RESPONSIBILITIES

5.1 TEST ORGANIZATION

The Test Evaluation Division, NOSC Code 933, will be responsible for planning, executing, and reporting of this test.

5.2 SUPPORT ORGANIZATIONS

This task is being performed by the Submarine Integrated Systems Branch, NOSC Code 8134, of the Submarine Systems Division, Code 813. The Program Office, Code 8134, is responsible for authorizing modifications or deviations from the approved test procedures and will have the authority to interrupt or discontinue testing. The Computer Peripheral Technology Branch, Code 8111, will be technical consultant to the test organization. The manufacturer of either of the units under testing will have the prerogative of having a representative in attendance during any test on its equipment. In turn, the representatives will be available for consultations.

5.3 TEST CERTIFICATION

No test certification procedures will be required, but Code 933 will assure that

a. Test procedures conform to acceptable state-of-the-art methodology

b. The tests have been performed in accordance with approved test procedures

6. SUPPORT REQUIREMENTS

6.1 PERSONNEL

The major personnel requirements for the environmental tests are expected to be:

1 Test engineer (with EMI expertise)

1 Test engineer (with miscellaneous environmental testing expertise)

1 Technician (having background with MIMS unit)

1 Consultant, Code 8111, Computer and Product Engineering Branch

There will be other short-term assistance requirements from test facility personnel.

6.2 FACILITIES

Table 5 identifies the necessary major test facilities. Facilities having equivalent capabilities may be substituted.

Table 5. Major environmental test facilities (located at NOSC)

Identification	Manufacturer/Model	Description
Shock test, high-impact, light weight	Naval Research Laboratory	Complex acceleration wave with 2000 g range for 15 to 35 msec
Vibration test	LAB, RVH 36-500	Frequency range: 5 to 60 Hz Maximum load: 500 lb Vertical, horizontal, and circular motion Displacement: 0 to 0.062 in.
Screen room	Mare Island Naval Shipyard	Contains RFI instrumentation for range from 20 Hz to 20 GHz
Temperature-humidity-altitude	Bemco, Inc.	Temperature range: -80° to 90°C Humidity range: 20 to 95% RH

6.3 TEST INSTRUMENTATION

A list of the expected test equipment will be compiled and included in the test procedure document.

7. SPECIAL REQUIREMENTS

7.1 PHOTOGRAPHS

Photographs shall be made of any typical or unique installation or mounting of the units under test for inclusion in the final report. The test engineer's discretion shall prevail.

7.2 SAFETY

The test personnel shall observe the safety precautions described in Article 1525 of NAVMAT P-5100 (Reference 20). Due to the nature of environmental testing there is a certain amount of risk involved. The potential for equipment damage or personnel injury is ever present; therefore, maximum protection for and awareness of personnel, equipment, facilities and the test item must be provided. The safety procedures and considerations for the specific test operations described in NAVORD OD 45491 (Reference 21) shall be the prevailing safety guide.

7.3 DATA RECORDING

All original test data will be recorded in a bound notebook which will be identified and held at the test facility.

---

20. Safety Precautions for Shore Activities, NAVMAT P-5100, March 1970.
21. Regulations for Environmental Test Operations, Standard Environmental Test Methods, NAVORD OD 45491, 1 January 1974.

8. TEST DOCUMENTATION

Planning, conducting, and reporting of the environmental testing task shall be documented by test plan, procedure and reports as described in the following paragraphs. The Test Conductor shall be responsible for the timely preparation and submission of test documentation and for the validity of the contents thereof.

8.1 TEST PLAN

The test plan defines the efforts to be accomplished during the environmental testing. It also provides the technical basis for developing detailed test procedures.

8.2 TEST PROCEDURE

The test procedure shall implement the test plan and provide the procedural instructions for conducting the tests. The objectives of the test procedure are to provide:

- An authoritative document to direct detailed conduct of testing
- A detailed management tool to assure that the test has been designed to satisfy test requirements in a valid manner
- Direction to the test support organizations

The test procedure shall include:

- Purpose of the test
- Sequence of tests
- Test conditions
- Performance requirements of the test
- Specific operations for accomplishing the test
- Requirements for test equipment and instrumentation
- Special requirements such as safety or security requirements
- Proof of specification compliance

8.3 DATA ANALYSIS

As each test is performed, the resulting data will be subjected to analysis to derive significant information of immediate interest. The final report will be prepared based on the results of this analysis. These results will also provide an indication to the Test Conductor of any problems that might exist in the progress of the test or in the recording of the data. These results also may affect the sequence of conducting future tests. A more thorough analysis will be performed at a later date to arrive at conclusions and recommendations for the final report.

8.4 DISCREPANCY REPORT

All indications of degradation, malfunctions and catastrophic failure shall be recorded on an NOSC DISCREPANCY REPORT form (see Figure 2), with only one failure described

per report. Copies of these reports shall be distributed to concerned personnel as soon as possible after a failure occurs.

8.5 TEST REPORT

The results of testing, data analysis and recommendations will be documented in a final report.

9. REFERENCES

1. Specifications for Building Submarines SSBN TRIDENT Class, Naval Ship Systems Command, NAVSHIPS 0902-027-7010, Volumes 1, 2 and 3, 22 May 1973.
2. Specification for Integrated Radio Room for TRIDENT Submarine, Naval Electronic Systems Command, 8556800F, 5 November 1977.
3. General Specification for Electronic, Interior Communication, Naval Ship and Shore, MIL-E-16400G, 24 December 1974 (with Amendment 1 dated 1 December 1976).
4. Test and Evaluation Plan (POSEIDON Communications Improvement Program), Naval Ocean Systems Center, NOSC Report 813-657, January 1979.
5. Military Standard, Standard General Requirements for Electronic Equipment, MIL-STD-454E, 1 March 1976.
6. Military Specification, *Plates, Tags, and Bands for the Identification of Equipment*, MIL-P-15024D, 10 May 1971.
7. Military Standard, Identification Marking of U. S. Military Property, MIL-STD-130L, 5 August 1977.
8. Military Standard, Environmental Test Methods, MIL-STD-810C, 10 March 1975.
9. Military Standard, Mechanical Vibrations of Shipboard Equipment (Type I—Environmental and Type II—Internally Excited), MIL-STD-167B, 11 August 1969.
10. Environmental Qualification of Teletypewriter Set, ECI Model OW1148U, for Cossor Electronics, E-Systems, Inc., ECI Div., Report No. 5-1546, 20 September 1978.
11. Military Specification, Shock Tests, H.I. (High-Impact); Requirements for Shipboard Machinery, Equipment and Systems, MIL-S-901C, 15 January 1963 (with Amendment 1 dated 5 September 1963).
12. Military Standard, Definitions of and Basic Requirements for Enclosures for Electric and Electronic Equipment, MIL-STD-108E, 4 August 1966.
13. Military Standard, Airborne Sound Measurements and Acceptance Criteria of Shipboard Equipment (Draft Status), MIL-STD-740-1.
14. Military Standard, Interface Standard for Shipboard Systems, D.C. Magnetic Field Environment, MIL-STD-1399 (NAVY), Section 401, 11 January 1971.
15. Military Standard, Electromagnetic Interference Characteristics, Requirements for Equipment, MIL-STD-461A, 1 August 1968 (with Notice 1 dated 7 February 1969).

16. Military Standard Electromagnetic Interference Characteristics, Measurement of, MIL-STD-462, 31 July 1967 (with Notice 1 dated August 1968).

17. TRIDENT EMC Control Plan, NAVSHIPS 0900-078-1010, Rev. D, 30 January 1977 (with Change 1 dated 7 November 1978).

18. Military Standard, Reliability Design Qualification and Production Acceptance Tests: Exponential Distribution, MIL-STD-17C, 21 October 1977.

19. Design Specification for a Teleprinter Set, ECI Model OW1149U, Issue 6, E-Systems, Inc., ECI Division, ES 20106, 16 June 1978.

20. Safety Precautions for Shore Activities, NAVMAT P-5100, March 1970.

21. Regulations for Environmental Test Operations, Standard Environmental Test Methods, NAVORD OD 45491, 1 January 1974.

NOSC FAILURE REPORT

SHT OF

PROJECT IDENTIFICATION

UNIT	S/N	MODEL	P/N

DATE	TIME	TEST IN PROGRESS AT TIME OF FAILURE

DISCREPANCIES: DESCRIBE NATURE OF FAILURE, CONDITIONS AND ENVIRONMENT

(CONTINUE ON REVERSE)

HISTORY: INDICATE TESTS AND ENVIRONMENTS TO WHICH UNIT HAS BEEN SUBJECTED. INDICATE PREVIOUS UNIT FAILURES, ETC.

(CONTINUE ON REVERSE)

TEST ENGINEER	PHONE	DATE

CORRECTIVE ACTION/DISPOSITION

(CONTINUE ON REVERSE)

COGNIZANT ENGINEER	PHONE	DATE

DATE OF SUCCESSFUL RETEST

CLASSIFICATION OF FAILURE

SIGNATURE	PHONE	DATE

NAVMAT-NOSC 4355/1 (4-77)

Figure 2

JSC FAILURE REPORT CONTINUATION
IND-JSC 4355/1 (4-77) (BACK)

DISCREPANCIES

HISTORY

CORRECTIVE ACTION/DISPOSITION

Figure 2 (Continued)